

*Revised  
12/1/81*

REQUEST FOR PROPOSALS

"FEASIBILITY STUDY FOR RECYCLING, REUSING AND/OR  
REHANDLING MATERIALS DREDGED OUT OF BALTIMORE HARBOR"

Draft  
June 18, 1981

Revised  
Recycle

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## INTRODUCTION

The Interstate Division for Baltimore City, acting as an agency of the Maryland Department of Transportation, State Highway Administration, is seeking Consultant services for the following tasks:

Phase I - To be completed in eight months after Notice to Proceed

- . Study the feasibility of recycling, reusing or rehandling materials dredged out of the Baltimore Harbor.

Phase II - To be completed within sixteen (16) months after Notice to Proceed on Phase II

- . Study the feasibility of establishing a permanent dredge material reuse/rehandling facility in Baltimore Harbor.

Total study period not to exceed twenty-four (24) months.

## BACKGROUND:

The Interstate Division for Baltimore City is responsible for the design and construction of the I-95/Fort McHenry Tunnel under the Baltimore Harbor. A Corps of Engineers 404 Permit was required before construction could begin. One of the conditions of the permit requires the Interstate Division to undertake a study of the feasibility of establishing a permanent dredge material rehandling/reuse facility in Baltimore Harbor.

It is estimated that within the Baltimore Harbor system the

maintenance of present navigational systems plus the construction of new projects, in both the public and private sector, will necessitate the disposal of approximately 120 million cubic yards of dredged material during the next 20 years.

(See Table 1) The volume and quality of material, environmental concerns and economic considerations make disposal of the dredged material difficult now and it is anticipated that it will be even more difficult in the future.

In the past all dredge spoil was generally disposed of by one of two methods. Either placing it behind a containment structure (or dike) to create fastland, or, by overboarding (placing the spoil back in the water outside the project area). Because of the recent awareness of the potential environmental problems associated with these methods, those agencies involved in the dredging process are looking for other options to dispose of dredged material that are more environmentally acceptable.

The primary method of alternate disposal has been the use of upland sites including abandoned or inactive mines, quarries, etc. However, recent studies have shown that unless the sites are effectively sealed, there exists a strong potential for groundwater contamination.

The U.S. Army Corps of Engineers, through its Dredged Material Research program, conducted by the Waterways Experiment Station in Vicksburg, Mississippi, investigated many aspects of disposing

of dredged spoil. One form of disposal that appears promising involves the placing, dewatering, densification and rehandling of the dredged spoil.

Although this method appears to work effectively for handling relatively good, coarse, unpolluted material, it did not address the problem of how to handle the fine-grained and/or heavily polluted material commonly found in major port areas. Studies that have been conducted in these areas show that these harbor bottoms generally contain high-to-excessive amounts of toxic heavy metals, organic pesticides, PCB's, etc. It is this type of material (fine grained and/or polluted) that causes the majority of our disposal problems. The coarse grained unpolluted material will generally meet the criteria that have been established for overboard disposal.

It can be argued that this type of approach will be expensive and this may be true. However, the costs involved must be balanced with the fact that the costs associated with disposing of dredge spoil are rising at a rapid rate. The pressures forcing this rise can only keep increasing as current disposal sites under permit are exhausted.

This is a request for a proposal for engineering/environmental services to carry out a feasibility study of methods, procedures and available equipment necessary for the placement and disposal of dredged material in an environmentally safe manner. While

the emphasis of this study will be engineering feasibility, environmental and economic impacts are to be developed in sufficient detail to enable a determination of which alternatives may be acceptable in all respects to the various responsible agencies and the public at large. The results of the study and the technology involved will be provided to the sponsoring agencies for dissemination to other states and federal agencies.

To the greatest extent possible existing literature and data will be utilized in the performance of all tasks, especially work of the Dredged Material Research Program of the U.S. Army Corps of Engineers and the environmental work performed for the Fort McHenry Tunnel.

#### CONSULTANT DUTIES

Phase I. The consultant shall study and recommend those processes that are feasible for dewatering, densifying and rehandling of the spoil material.

- A. Evaluate the potential for air/water pollution from the operation of the facility.
- B. Estimate the volume of dredged material that can be handled by the facility on a daily, weekly and yearly basis.
- C. A preliminary cost estimate for the facility and types of rehandling processes are to be prepared.

Phase II. The Consultant is to investigate the feasibility of the following areas in the Harbor for location of the rehandling/recycling facility:

1. Marley Neck
  2. Canton/Seagirt
- A. The Consultant shall prepare a preliminary conceptual site plan for the operation of a complete rehandling facility to include at least the following:
1. Modes of Transport  
The Consultant shall study and recommend the procedures for rehandling the spoil material to load on either rail, trucks or barge, to and from the facility.
  2. Operational Layout
- B. Evaluate the potential for air/water pollution from the operation of the facility.
- C. As part of the conceptual design of the facility, the Consultant is to perform the following:
1. Assess treatment of material to make it suitable for use as fill or other type of by-product.
  2. Develop options for treatment of contaminated material.
  3. Assess market for by-products or land creation.  
e.g. Upland disposal (mine filling or reclamation, solid waste sites cover, landfills, etc.)
- D. Estimate the volume of dredged material that can be handled by the facility on a daily, weekly and yearly basis.
- E. A preliminary cost estimate for the facility and types of rehandling processes are to be prepared.

Phase III. Preparation of Technical Report - The Consultant will prepare a detailed Technical Report which documents the work performed under this contract. A draft will be required for each Phase of the project. The document should be prepared in a format acceptable to the I.D.B.C. Twenty-five (25) copies of the draft and three hundred (300) copies of the final documents will be supplied by the Consultant to provide for inter-agency review. The Consultant will not proceed with the final report until the drafts have been reviewed and accepted by I.D.B.C.



MATERIALS AVAILABLE TO CONSULTANT (to be supplied by IDBC)

I.D.B.C. Reports

1. The I-95/Ft. McHenry Tunnel Final Environmental Impact Statement.
2. Canton/Seagirt Final Environmental Impact Statement.
3. Technical Reports 1 through 4 supporting the above.
4. Copies of the I-95/Ft. McHenry Tunnel Boring Logs.
5. All information developed for Marley Neck site plus available boring logs.

M.P.A. Reports

6. Background on the dredging problems of the Port of Baltimore.
7. An assessment of the dredging requirements of the Port for the next 20-30 years.
8. Available reports detailing harbor sediments and analysis.

TABLE I

ESTIMATES FOR NEW AND MAINTENANCE DREDGING  
BY LOCATION - INSIDE AND OUTSIDE BALTIMORE HARBOR

NEW PROJECTS			
	<u>Inside Harbor*</u>	<u>Outside Harbor</u>	<u>Sub-Total</u>
50' Channel	23.4	23.3	46.7
IDBC Tunnels	6.4		6.4
Industry	2.2		2.2
New Maritime Developments	12.2		12.2
C&D Canal		7.2	7.2
MPA	13.3		<u>13.3</u>
TOTAL NEW PROJECTS			88.0

MAINTENANCE PROJECTS			
	<u>Inside Harbor*</u>	<u>Outside Harbor</u>	<u>Sub-Total</u>
42' Channel	2.0	2.0	4.0
MPA	3.0		3.0
Industry	1.5		1.5
C&D Canal		23.5	23.5
C&D Connection		.5	<u>.5</u>
TOTAL MAINTENANCE PROJECTS			32.5

Total Needs . . . . . 120.5 MCY\*\*

\*Material inside Baltimore Harbor cannot be overboarded in Bay (by act of  
General Assembly)

\*\*Million Cubic Yards.

MARYLAND PORT ADMINISTRATION

INTER-OFFICE MEMORANDUM

June 10, 1981

To: Mr. W. G. Halpin & Mr. R. L. Nelson

FROM: L. W. Willett *LWW*

SUBJECT: Rehandling Facilities - Hart-Miller Island Project

During our meeting of 9 June 1981 with Col. Peck of the Baltimore District, the question was raised as to whether the State (MPA) could be in a position to comment on the recent Corps of Engineers proposal on fast-tracking by or before the 50' Channel hearing which is scheduled for 24 June 1981. In response, I stated that we were presently investigating the issue and may have our general comments within ten days to two weeks.

LWW:drb

*Ruse*

## Agenda

Meeting with Maryland Port Administration  
3 June 1981

Subject: Rehandling Dredged Material, Hart-Miller Island

### I. BACKGROUND

- A. Feasibility Report specified non-Federal responsibility for rehandling dredged material from Baltimore Harbor and Channel project.
- B. Maryland's sizing of rehandling equipment based on 8 year schedule shown in draft GDM.
- C. GDM work has examined a full funding schedule and increased industry capability resulting in a potential 3 year schedule.
- D. Maryland work has become critical path based on 3 year schedule.
- E. Coordination with Maryland on increasing rehandling capability identified financial constraints.
- F. Coordination with industry for most efficient procedure dredging has identified potential contract constraints.
- G. Baltimore District has reviewed rehandling responsibilities.

### II. PURPOSE IN REVIEWING REHANDLING RESPONSIBILITY

- A. Achieve capability for shorter completion time.
- B. Reduce total and Federal construction costs.
- C. Facilitate management of contract.
- D. Achieve efficiency in use of rehandling equipment.

### III. INVESTIGATION RESULTS SHOW:

- A. Shorter completion time can be achieved.
- B. Both Federal and non-Federal costs can be reduced.
- C. State could acquire equipment for only its own continued needs at Hart-Miller.
- D. Flexibility in use of other methods of rehandling equipment can be achieved.

Agenda (continued)

Meeting with Maryland Port Administration  
3 June 1981

Subject: Rehandling Dredged Material, Hart-Miller Islands

III. INVESTIGATION RESULTS SHOW: (continued)

- E. Contractor could be made responsible for achieving contract schedules desired by Federal and State.
- F. Close coordination to achieve State and Federal controls with contractors is required.
- G. Work might be initiated sooner if rehandling equipment does not have to be provided by State.

IV. INFORMATION NEEDED FROM MARYLAND

- A. Potential for operating Hart-Miller on a 3 year construction schedule.
- B. Potential for operating with government contractors.
- C. Potential for meeting water quality and other regulating constraints at Hart-Miller.
- D. Types of contract provisions to be incorporated into contract.
- E. Potential for initiating work sooner.

V. CLARIFICATIONS

- A. Breakdown of O&M costs at Hart-Miller during dredging period.

3 yr @ 20 million yd<sup>3</sup> per yr

• Assume 7 Day per wk operation

$$\frac{20,000,000}{365} = 54,794 \text{ yd}^3 \text{ per day (Solid, or Semi Fluid)}$$

$$54,794 \text{ yd}^3 = .20 \times$$

$$\times = 273,970 \text{ yd}^3 \text{ per day}$$

SUMMARY OF ESTIMATED FIRST COST (\$1,000)

(February 1981 Price Level)

ECONOMIC COST (Initiating Contracts Simultaneously)

	<u>3-Year Project Schedule</u>	<u>6-Year Project Schedule</u>	<u>8-Year Project Schedule</u>	<u>8-Year Project Schedule w/ State of Maryland Rehandling</u>
<b>FEDERAL COSTS</b>				
Dredging				
Virginia Channels	\$ 75,100.0	\$ 75,100.0	\$ 75,100.0	\$ 75,100.0
Maryland Channels	136,200.0	136,200.0	158,400.0	145,100.0
Engineering & Design	6,300.0	6,300.0	7,000.0	6,600.0
Supervision & Administration	11,600.0	11,600.0	12,850.0	12,100.0
Aids to Navigation	150.0	150.0	150.0	150.0
Monitoring Program	<u>3,500.0</u>	<u>3,500.0</u>	<u>3,500.0</u>	<u>3,500.0</u>
TOTAL FEDERAL COSTS	\$232,850.0	\$232,850.0	\$257,000.0	\$242,550.0
<b>NON-FEDERAL COSTS</b>				
Dredging				
Private Channels	\$ 10,480.0	\$ 10,480.0	\$ 10,480.0	\$ 10,480.0
Diked Disposal Area	33,800.0	33,800.0	33,800.0	33,800.0
Rehandling Dredged Material				
Equipment Cost	--	--	--	19,400.0
O&M During Dredging Period	29,800.0	34,300.0	39,300.0	39,300.0
Electric Cable Relocation	<u>2,000.0</u>	<u>2,000.0</u>	<u>2,000.0</u>	<u>2,000.0</u>
TOTAL NON-FEDERAL COSTS	\$ 76,080.0	\$ 80,580.0	\$ 85,580.0	\$104,980
TOTAL PROJECT COSTS	\$308,930.0	\$313,430.0	\$342,580.0	\$347,530.0

28 May 1981

BALTIMORE HARBOR AND CHANNELS  
50-FOOT PROJECT

DREDGING OPERATIONS AND SCHEDULES

Following is a description of the basis for the cost estimates developed assuming that Federal contractors have full responsibility for placing the dredged material into the Hart/Miller Containment Facility. Estimates were developed for 3, 6, and 8-year dredging schedules. The Maryland Channels are the critical segment of the project from a scheduling standpoint. The attached bar chart presents the sequencing of two major dredging contracts to meet 3, 6, and 8 year schedules in Maryland. The schedule for the Virginia Channels can be modified to fit a 3, 6, and 8 year project schedule. The following discussion deals only with the critical Maryland Channels.

1. Three-Year Schedule: Two contracts would be developed, each having average new work dredged quantities of 20 million cubic yards. Total dredge quantities would be greater due to necessary maintenance and non-pay over-depth allowances.

Each of the two contracts extend over the full 3-year period, and it is anticipated that each contractor would have two dredges working simultaneously at all times. It has been determined that the most reasonable dredging plan at this time consists of a bucket and scow operation with short distance pumping of material into the containment area. An operation including long distance pumping directly from the dredging site was also considered but ruled out as being more costly and inefficient. However, contract bids could very well include some long distance pumping and, if found to be least costly, this type of process could be part of the project dredging.

The estimates reflect a bucket and scow dredging operation using 3000 cubic yard scows. The scows would be transported to the rehandling facility by medium size tugs, at which point their payload would be slurried and pumped into the containment area. The rehandling facility would be located approximately 2500 feet from the Hart/Miller facility, in a location which will permit unrestricted access by the tugs and scows, without encountering shallow water.

Each contract would be serviced by one contractor-owned rehandling facility (with 9 million cubic yards capacity per year). The operation of the two dredges for each contract was balanced with the rehandling capacity to assure maximum productivity.

Each contract also has both an inner harbor (protected area) and a bay channel (open area) section so that contractors can schedule work based on weather conditions.

Total 60,000,000 yd<sup>3</sup> For 3 yrs  
Per Year = 20,000,000 yd<sup>3</sup>

$$\frac{20,000,000}{3000} = 6667 \text{ scows} = \frac{6667}{365} = 18.26 \text{ scows per day}$$

Incl 2

2. Six-Year Schedule: The two contracts envisioned for the 3-year schedule would be awarded in sequence to produce the 6-year schedule. This assures that each contractor can work at maximum production rates at all times.

Type of dredging operation is identical.

3. Eight-Year Schedule: Two contracts would again be used. The first contract would be a 3-year contract similar to those discussed previously. The second contract would be a 6-year contract starting during the third year of the first contract. This assumes that the contractor can be restricted to a 6-year production rate. The 6-year contract assumes the contractor would use one dredge, operating at maximum production rates, over the contract period. The method of operation would be the same as stated previously.

It should be noted that discussions with three separate contractors and WRSC-D personnel have determined without question that private industry has the capability to dredge the Maryland Channels over a 3-year period provided that the contractors are permitted to establish their own rehandling facilities. Any extension of the schedule beyond the optimum 3 years results in additional costs due to price level rise and production inefficiencies.

#### *Administration*

The Maryland Port Authority (MPA) to date has provided limited information concerning their plans for a rehandling facility; however, they have stated that they would provide two floating plant pump-out barges located at the diked facility, each of which could rehandle a maximum of 3.5 million cubic yards of dredged material per year. This rate supports an 8-9 year schedule. To meet a 3-year schedule, the MPA would have to provide five of these pump-out facilities. Since each barge could support one dredge, the following inefficiencies and cost increases develop:

- a. Need for five contractor dredges to meet the required 3-year production rate (versus four with contractor rehandling). This creates additional mobilization and demobilization costs.
- b. Additional hauling distance for scows, and possible need for smaller scows due to limited depths immediately adjacent to the Hart/Miller facility. Additional waiting time for scows is anticipated.
- c. State must purchase extensive new plant, most of which will not be needed after the 3-year contract period.
- d. Inherent problems with State operating as "middle man" in the dredge operation, especially when State operated equipment breaks down or damages contractor-owned equipment. Contractors can plan to have back-up equipment on stand-by, whereas the State would not.
- e. Contractor must reduce his production rates to assure he does not exceed the maximum daily rehandling rate provided by the State. Alternatively, the contractor may operate at a higher rate than the State can rehandle and make claims for delays incurred waiting for scows to return.



Each of the three contractors interviewed recently indicated that they foresee major operating problems if the State has control over the rehandling operation. However, it is recognized that the contractors would, under <sup>any</sup> ~~under~~ circumstances, have to comply with State requirements, such as water quality criteria, for operation of the containment facility.

1 Attachment

SUBJECT MARYLAND CHANNELS DREDGING - 50-FOOT PROJECT

SHEET \_\_\_\_\_ OF \_\_\_\_\_ SHEETS

DATE \_\_\_\_\_

**Abstract**

Contract 1

*Cranial Entailment*

Contract 2

Cott. Brew. Angle & Brew Ltd.  
Brew - Ft. M. H. Ang. & Ft. M. H. Ltd.  
Northwest Ltd.

3 yr 5 mos

425 yr 9

8 YR 52H

3 1/2 5H

9 yr 11 mo

8 YR 52H

TIME, CALENDAR YEARS

Yr 1 Yr 2 Yr 3 Yr 4 Yr 5 Yr 6 Yr 7 Yr 8



# Maryland Department of Transportation

State Highway Administration

Reuse

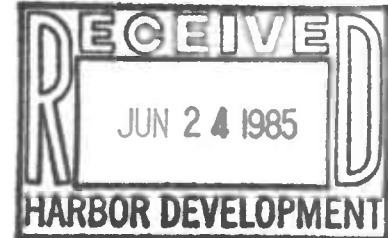
William K. Hellmann  
Secretary

Hal Kassoff  
Administrator

June 20, 1985

PLEASE REPLY TO:  
INTERSTATE DIVISION FOR  
BALTIMORE CITY  
2225 N. CHARLES STREET  
BALTIMORE, MARYLAND 21218

Mr. Frank Hamons  
M.P.A.  
World Trade Center  
19th Floor  
Baltimore, Maryland 21201



Subject: FAP No. I-95-4(45)  
SHA No. BC 246-130-815  
Dredge Material Rehandling  
Study

Dear Mr. Hamons:

Enclosed for your review and comment is a copy of the Phase III Report for the subject project. In order that we may finalize this report, your comments are requested by Monday, July 8, 1985. They may be sent to Mr. Jeff Drinkwater of our Environmental Section, 2225 North Charles Street, Baltimore, Maryland 21218.

Thank you for your continued cooperation.

Very truly yours,

M. Faysal Thameen  
Deputy Chief - Development  
Interstate Division for Baltimore City

MFT:als

Enclosures

cc: Mr. E. A. Terry  
Mr. J. K. Drinkwater

My telephone number is (301) 396-7292

Teletypewriter for Impaired Hearing or Speech

383-7555 Baltimore Metro — 565-0451 D.C. Metro — 1-800-492-5062 Statewide Toll Free

P.O. Box 717 / 707 North Calvert St., Baltimore, Maryland 21203 - 0717

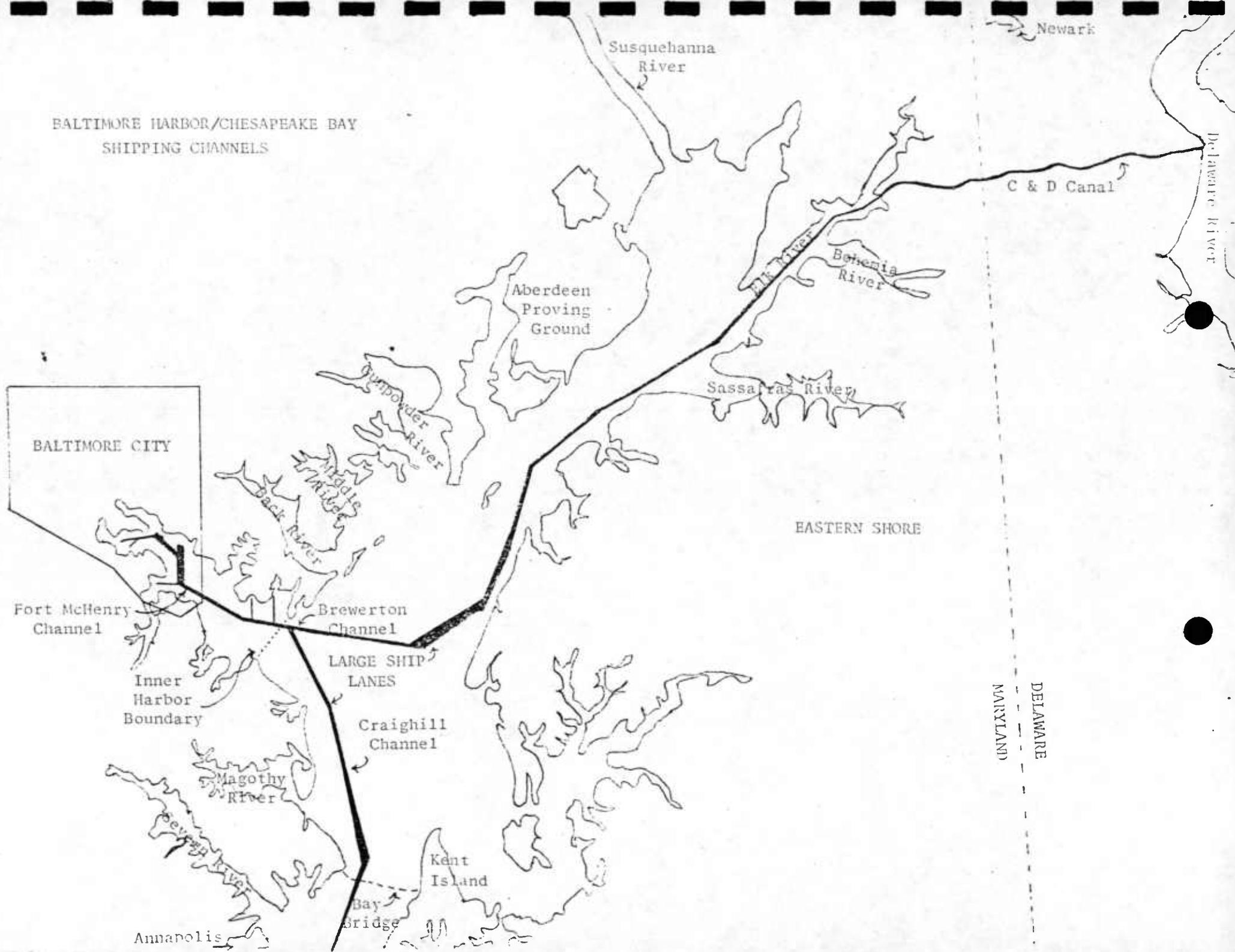
*Reuse/Recycle*

A MARYLAND DEPARTMENT OF TRANSPORTATION  
AND MARYLAND DEPARTMENT OF NATURAL RESOURCES UNDERSTANDING  
ON REUSE/RECYCLING OF DREDGED MATERIAL\*

AUGUST 20, 1979

\*Prepared by the Maryland Department of Transportation and  
coordinated with the Maryland Department of Natural Resources. PRF

BALTIMORE HARBOR/CHESAPEAKE BAY  
SHIPPING CHANNELS



## BACKGROUND

The Port of Baltimore is the fifth largest port in terms of tonnage of foreign waterborne commerce and the fourth largest in volume of container cargo in the United States. In recent years, the Port marine terminals have handled as much as 43 million tons of foreign cargo with total annual commerce representing some 60 million tons. Current Maryland Port Administration figures on the value of the Port to the economy of Maryland indicate that the Port contributes \$30 billion to the economy annually. Further, 10% of all jobs in the State are Port related.

The Port presently suffers a backlog of dredging work associated with the 42' channels in the Chesapeake Bay and Harbor, the Chesapeake and Delaware (C&D) Canal and private dredging work. In addition, a 50' channel has been authorized by Congress which will dramatically increase the volume of dredged material which must be accommodated over the next several years.

The authorized increase in dredged depth from the existing 42 feet to 50 feet in Baltimore Harbor will relate primarily to the Port's ability to compete effectively for the bulk cargo trades. The 50 foot Channel Project is important, not only to assure the continuance of this present level of trade, but, also, to permit the Port to share in projected increases of bulk cargo worldwide.

## THE PROBLEM

A critical problem facing the Port of Baltimore is the removal of a vast quantity of dredged material and its disposal in an economic and environmentally acceptable manner. In the next 20 years, 120.5 million cubic yards (mcy) of material must be dredged. Of this, 88 mcy is associated with deepening channels, both public and private, and 32.5 mcy is associated with maintenance dredging. In total, some 97 mcy may have to be contained while 23.5 mcy can logically be placed overboard (See Table I).

A further breakdown of the 120 mcy by location indicates that 64 mcy is located within the Harbor while 56.5 mcy is located outside the Harbor. Baltimore Harbor is defined as an area northwest of a line passing through North Point and Rock Point (see Map 1). This is significant because of the prohibition by the Maryland General Assembly against overboard disposal into the Chesapeake Bay of material dredged inside Baltimore Harbor.

Even environmentally acceptable dredged material outside the Harbor area cannot automatically be disposed of by overboard disposal because of opposition from watermen and others who believe that overboard disposal is undesirable no matter what the quality of material.

This aspect of the problem must be considered since it can have a major effect on the total cost of the dredged disposal program.

TABLE I

ESTIMATES FOR NEW AND MAINTENANCE DREDGING  
BY LOCATION - INSIDE VS OUTSIDE BALTIMORE HARBOR

NEW PROJECTS			SUB- TOTAL
	<u>INSIDE HARBOR*</u>	<u>OUTSIDE HARBOR</u>	
50' Channel	23.4	23.3	46.7
IDBC Tunnels	6.4		6.4
Industry	2.2		2.2
New Maritime Developments	12.2		12.2
C&D Canal		7.2	7.2
MPA	13.3		13.3
TOTAL NEW PROJECTS-----			88.0
MAINTENANCE PROJECTS			SUB- TOTAL
	<u>INSIDE HARBOR*</u>	<u>OUTSIDE HARBOR</u>	
42' Channel	2.0	2.0	4.0
MPA	3.0		3.0
Industry	1.5		1.5
C&D Canal		23.5	23.5
C&D Connection		.5	.5
TOTAL MAINTENANCE PROJECTS-----			32.5
TOTAL NEEDS-----			120.5 MCY**
LESS OVERBOARD FROM C&D CANAL AND APPROACHES-----			-23.5 MCY
NET QUANTITY OF DREDGED MATERIAL-----			97.0

\* Material Inside Baltimore Harbor Cannot Be Overboarded In Bay

\*\* Million Cubic Yard

## NATURAL CONSTRAINT

The Chesapeake Bay is a relatively shallow body of water with a mean depth of less than 28 feet. As a result of shallow depth and sedimentation, there is a constant need to maintain ship channels from the Chesapeake Bay Bridge (the William Preston Lane Bridge) to the Baltimore Harbor and from the Baltimore Harbor to the C&D Canal. Sediment is constantly being carried into the Bay system as part of the natural drainage system but the quantities of material have been accelerated by human activity. In addition, there is a sloughing off of channel banks as a result of tidal action and ship passage. These activities add 1½" to 3" of material to the bottom each year but, at certain points along the channel, the sedimentation rate is much greater. Further, a natural phenomenon which greatly influenced the backlog of dredging needs was "Hurricane Agnes" in 1972. This tropical storm caused tremendous flooding and sediment transport in the Susquehanna River Basin and badly silted the C&D Canal approach channel.

## SOURCES OF DREDGED MATERIAL

Dredge spoil is generated in the Baltimore Harbor area from a number of sources. Functionally, the generation of dredge material comes from maritime, transportation, and non-maritime sources. The material also can be segregated by private, State, and Federal sources. Federal projects amount to some 68% of total dredging requirements and the State of Maryland has responsibility for designating areas for spoil disposal for Federal and State projects. State projects for maintenance and new development account for 19% of total needs and private work constitutes 13% of total dredging needs as noted in Table II.

## THE SHORT RUN PROBLEM - QUANTITY AND PLACEMENT

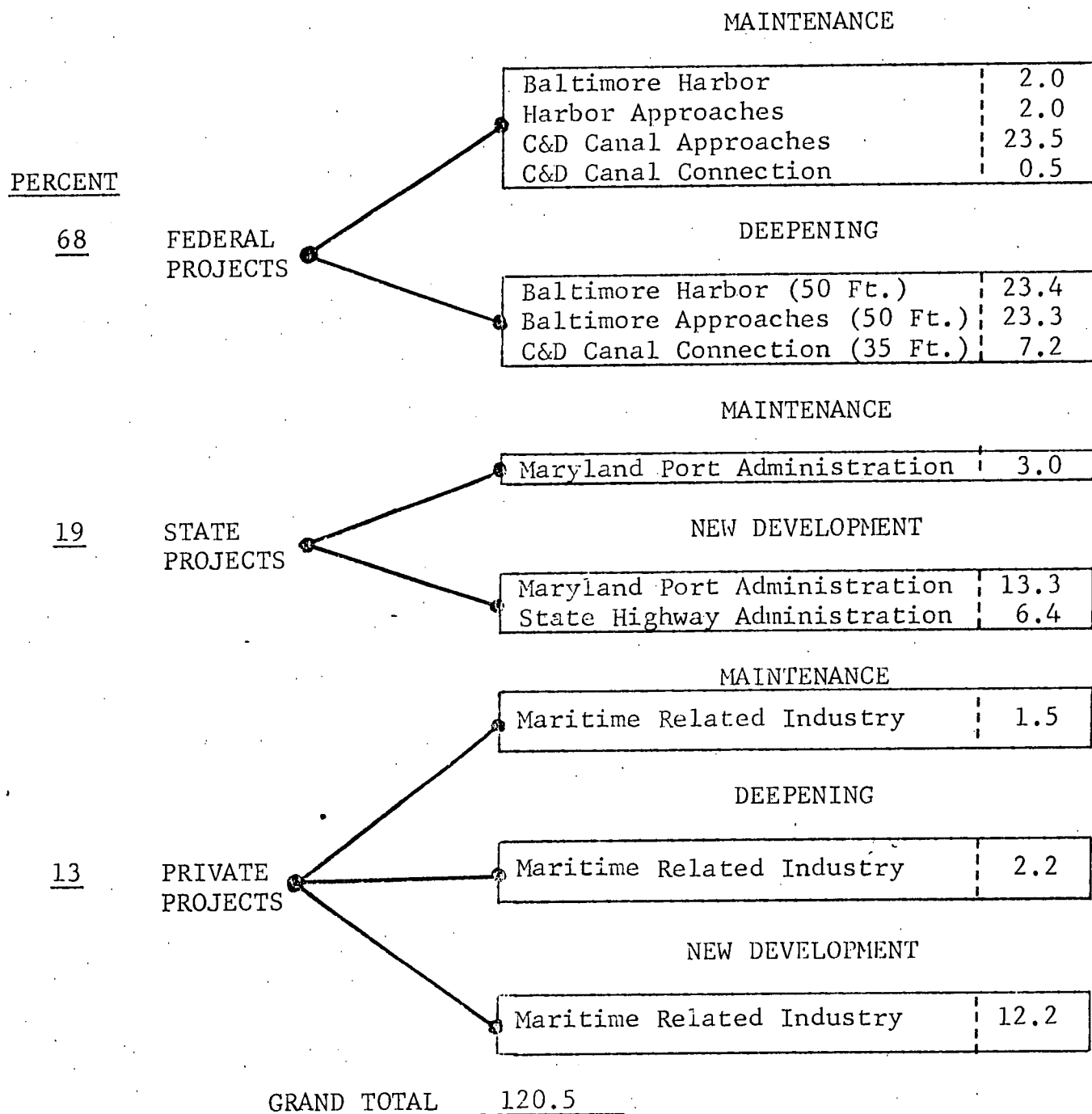
In the next ten years, 75% of the 20-year dredged material requirements must be accommodated. Approximately 50% of this material lies inside the Harbor and cannot be disposed of overboard in the Bay. Therefore, diked disposal areas such as the proposed Hart and Miller Island project, which is economical and has a large capacity, must be constructed as soon as possible to satisfy this need.

One particular short run disposal problem involves the need to dispose of approximately 3 mcy of harbor dredged material from the I-95 tunnel project and approximately 3.4 mcy of harbor dredged material from the I-83 tunnel construction. There is also an urgent need to accommodate dredged material from port-oriented industry.



TABLE II  
PORT OF BALTIMORE  
DREDGING REQUIREMENTS\*

(Figures Shown in Million Cubic Yards)



\*Source: Maryland Port Administration

Although there is no prohibition against unconfined disposal of dredged material within the confines of Baltimore Harbor, as a practical matter, the capacity for such disposal is quite limited. In addition, this practice is limited by legislative and permit agency requirements.

#### PAST APPROACHES TO DREDGED MATERIAL PLACEMENT

Until recently, dredging and the disposal of dredged material from projects in the Chesapeake Bay and the Harbor was a simple and inexpensive practice. The disposal operation was merely a matter of dumping the material into an open-water basin or trench. In the early 1960's, the U.S. Army Corps of Engineers delegated to local interests the responsibility for disposal of dredged material. The responsibility for channel dredging work is assigned to the Corps of Engineers.

In 1968, the Commission on Submerged Lands, which was advisory to the Maryland Board of Public Works, recommended that funds be made available for the study, planning, and construction of a spoil containment facility in the vicinity of Baltimore Harbor. In 1969, the Maryland General Assembly authorized, in Senate Bill 623, the expenditure of \$13 million for a containment facility in Senate Bill 623.

The Commission on Submerged Lands also recommended that spoil disposal from Baltimore Harbor projects be deposited at Poole Island Deep, this being an interim solution until confined disposal was a reality. In 1975, Senate Bill 28 (Maryland Legislature) banned all unconfined overboard disposal of Baltimore Harbor dredged material into the Chesapeake Bay. Since a diked containment area has not been constructed as previously provided for in Senate Bill 623, disposal of a limited quantity of Harbor dredged material for maintenance work has been deposited at onshore land tracts. This practice has continued to the present, making onshore sites scarce and expensive. Hence, there is now an urgent need to construct containment sites for the spoil disposal requirements of Baltimore Harbor and its approach channels. The first containment facility site selected by the State was at Hart and Miller Island.

#### ALTERNATIVE DISPOSAL OPTIONS AND COSTS

There are two generally accepted methods for disposing of dredged material. The first is on land and the second is in the water. On land, options include: filling sealed quarries; placing

the material on fast land or behind dikes and letting it dewater; or placing it in abandoned strip mines.

In water, options include; dumping at sea, in the Bay, or behind diked areas in the water. The relative costs of dredged material disposal, using various methods, is compiled in the following Table:

TABLE 3  
APPROXIMATE COSTS OF VARIOUS DISPOSAL OPTIONS

<u>Method</u>	<u>Disposal Cost Per Cubic Yard*</u>
Open Water Disposal	\$ 3.00 to \$ 4.02
On-Land Disposal, Perimeter of Harbor	\$ 5.60 to \$ 8.60
Possible Cost, Hart-Miller Site	\$ 6.95
Possible Cost, Anne Arundel County Harbor Site**	\$ 7.20
Ocean Dumping	\$10.90
Disposal-Abandoned Borrow Pits	\$10.20 to \$12.60
Possible Costs of Recycling/Reuse***	\$12.00
Disposal at Strip Mine (Rail Delivery)	\$21.60
Disposal at Strip Mine (Pipeline)	\$26.50

\*These are order of magnitude figures based upon reasonable estimates prepared by the Maryland Port Administration for the cost factors involved in dredging by bucket and scow methods (July 1979 data).

\*\*This site's relatively large capacity of 14.7 million cubic yards and more stable bottom conditions make it an economic site.

\*\*\*The continuing rise in energy costs may not be accurately reflected in this cost.

Since open water disposal is not permitted for much of the Harbor dredging work, these cost figures provide a comparison to other methods.

Economic on-land disposal sites at the perimeter of the Harbor have small capacities and are virtually exhausted, but they represent the most current available method of disposal. Harbor containment sites have low transportation costs because of proximity to ship channels; however, their capital cost is high given poor bottom conditions and their small size.

Containment areas, such as Hart and Miller Island, represent a present estimated capital cost of about \$7.00 per cubic yard and appear to be the most feasible alternative to previously used methods of overboard disposal.

The approach of the State of Maryland during the last ten years, as noted in Table 3, has been to proceed with the most cost effective and environmentally acceptable solution to the problem. This has involved purchase of sites which offer some on-land capacity (limited), pursuit of the Hart and Miller Island project, purchase and investigation of harbor sites, and an investigation of reuse possibilities.

There are two recycling concepts when talking about dredged material. The first relates to reuse of the material for other productive uses such as sand, gravel, and topsoil; the second relates to reuse of a site created by dredged material for industrial or recreational purposes.

#### THE PRESENT APPROACH

There is a need for prompt creation of dredged material containment areas. More specifically, the need to create an area of the size of the Hart-Miller Island containment area, with its 52 mcy capacity, becomes paramount. Coincident with this development is the State's desire to acquire an Anne Arundel County site in Baltimore Harbor and to develop it for storage of 14.7 mcy of dredged material. The Interstate Division for Baltimore City (IDBC) proposes to develop the Colgate Creek site in Baltimore Harbor to accept 3 mcy of material. As noted in Table 4, the Masonville site, now owned by the State, could provide storage for up to 6 mcy. Altogether, these four sites provide a total of 75.7 million cubic yards of capacity, essentially satisfying the requirements of the initial 10-year demand of 71 mcy.

TABLE 4

DREDGING ESTIMATES AND SITE CAPACITIES  
(Million cubic yards)

Total 20-Year Dredging Needs	
(Less overboarding of C&D	120,500,000
Canal approaches)	<u>-23,500,000</u>
NET QUANTITY TO BE DISPOSED OF -----	<u>97,000,000</u>
<u>Present Sites Under Consideration</u>	
Harbor Sites*	6,000,000 (high estimate)
Masonville (purchased-quantities to	
be accepted depend on	
Master Plan Study)	
Anne Arundel County Harbor Site**	14,700,000
Colgate Creek (IDBC project)	3,000,000
Hart & Miller Island Disposal Area	<u>52,000,000</u>
TOTAL CAPACITY -----	<u>75,700,000</u>
Net Deficiency	<u>21,300,000</u>

\*Other harbor sites have been identified in the past but all have problems associated with cost, availability, or feasibility.

\*\*An engineering feasibility study is needed to determine precise quantities which can be accommodated.

It is recognized that the present crisis situation and the short term needs (over the next 20-year period) can be satisfied by the containment method. But this is not the ultimate solution because potential containment sites will inevitably be exhausted. Even if the 50' channel is not built, Maryland will run out of economical sites in future years.

With the containment concept no longer feasible, it is necessary to consider less presently available and less economical options such as abandoned quarries, ocean dumping (if environmentally permissible), or strip mining sites. However, a more exciting possibility that promises an inexhaustible life cycle and, hopefully, will show cost factors superior to such alternatives is the concept of a reuse/recycling facility.

Hence, the present State program can be characterized as having both a short term and long term solution phase which can be summarized as follows:

#### Short Run Solution Phase

- (1) Place environmentally acceptable dredged material overboard.
- (2) Move forward as rapidly as possible with construction of the Hart and Miller Island facility.
- (3) Implement harbor containment sites such as the Anne Arundel Harbor site, Colgate Creek, and Masonville.

#### Long Term Solution Phase

- (4) Study the possible reuse of materials through a recycling facility or plant.

#### SPOIL GENERATED BY INTERSTATE TUNNEL CONSTRUCTION

The I-95 and I-83 tunnels are expected to generate 6.4 mcY of dredged material in the next several years. As noted earlier, the dredged material from these sites cannot be placed back in Bay waters in an unconfined manner since the construction is within the North Point/Rock Point (Harbor) boundary as defined by the Maryland General Assembly. Thus, these projects add to the burden of the State of Maryland and local government to find acceptable locations for disposal of the material. In the short run, the material must be accommodated on land or in confined disposal areas. However, it is appropriate to immediately begin investigation of new methods of resource reuse and management as a long run solution to the problem.

#### THE NEED FOR A REUSE/RECYCLING FACILITY

A creative approach for Harbor spoil is sought for the future - a break away from the constraints of open water disposal or contained disposal. The promise of recycling methods must be thoroughly explored since it gives the promise of a permanent solution. It is proposed that a consultant investigate the feasibility of this technique.\*

\*Previous work in this area includes a consultant study prepared for the Maryland Environmental Service on, "The Technical and Economic Feasibility of Producing Beneficial Products from Baltimore Harbor Dredged Spoil" by Roy F. Weston, West Chester, Pa.; March 28, 1974. Also, a report prepared by the Maryland Water Resources Administration entitled, "Management Alternatives for Dredging and Disposal Activities in Maryland Waters". Final Draft in August, 1977 recognizes dredged material recycling as a long term option.

The specific proposal presented would create a permanent spoil disposal facility which would attempt to convert the dredged material into useable by-products in an economic manner. In the longer run, there is a need for a solution to the continual problem of dredging Maryland ship channels. As noted, in the long run it must also be realized that the best sites for disposal will have been utilized. The options which need to be investigated include diked area reuse management (DARM) presently under study by the U.S. Army Corps of Engineers in Vicksburg, Mississippi and the possible construction of a plant which would dewater dredged material, or possibly some combination of methods. A Maryland Department of Transportation evaluation and feasibility study of areas to accommodate dredged material in the short run and as a location for such a facility in the longer run needs to be investigated. The site would ideally be located in an industrial area in close proximity to Harbor channels. The objective of such a facility would be to continually process or recycle maintenance dredging materials on an annual basis.

#### SCOPE OF WORK

It is proposed that a consultant be retained for this work. The consultant would evaluate the feasibility of using various sites as a permanent reuse site. This would involve looking at the possibility of reusing present diked areas after dredged material is sufficiently consolidated, review construction options for a plant which would make bricks or aggregate, or possibly end up with material such as topsoil or fill. The quality of such material, before and after drying, would also be investigated. Naturally, a key element in such a study is the capital and operating costs of the plant or facility contrasted with the value of the product produced. It should be noted, however, that the quality of dredged material and energy costs may place constraints on the final development of a recycling program.

#### STUDY BUDGET

In order to thoroughly evaluate the potential of sites to accommodate a reuse facility, both operating and maintenance costs must be evaluated. Also, site constraints and opportunities must be thoroughly analyzed. The anticipated cost for the study is \$750,000 to \$1,000,000. While this is a large sum of money, this method does offer potential savings in future years since the most economically sound containment sites will have been developed as noted earlier in Table 3.

## STUDY MANAGEMENT

This study will be managed by the Department of Transportation and Department of Natural Resources, consistent with the Memorandum of Understanding on Dredging and Spoil Disposal approved by the Maryland Board of Public Works on June 6, 1979. The Interstate Division for Baltimore City will prepare the scope of work for the study and have overall management responsibility with involvement by Department of Natural Resources, Maryland Port Administration, Office of the Secretary (DOT), and appropriate local jurisdiction. The consultant selection process used by IDBC will be employed with input from the Department of Natural Resources and the Office of the Secretary, Maryland Department of Transportation.

## PROGRAM REVIEW

The detailed scope of work will be reviewed by appropriate environmental agencies at the highest level to ensure an agreed upon approach to the study and to ensure coordination and cooperation in this endeavor.

## TIME FRAME

It is anticipated that the study would take 18 months to complete.

## A COMPREHENSIVE APPROACH

This paper notes the reuse/recycling strategy is part of a comprehensive State approach to the dredged material problem which involves one large containment area in the Bay, Harbor disposal sites, and overboarding of environmentally acceptable material.

The economic benefits from the Port of Baltimore accrue to both the Baltimore Region and to the State. The solution to the dredged material disposal problem must also be region-wide. The present comprehensive approach involves containment facilities in Baltimore City (Harbor sites), Baltimore County (Hart and Miller), and a Harbor site in Anne Arundel County. It is not inconceivable that sealed quarries in other jurisdictions may someday also be needed to accommodate dewatered dredged material.

The ability of the Port to properly maintain and improve ship channels is in the National, State, and public interest. The maintenance and development of Port activity also directly impacts on use of highway facilities both in a regional and national sense.